

Underwater Noise: Impact Pile Installation and the Endangered Species Act

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Effects of Impact Installation of Steel Piles on Fish and Seabirds

- Port of Vancouver, BC
- Washington State Ferries, WA
- Caltrans, CA



Docks and the Nearshore

- Docks and piers often built in shallow nearshore areas
- Interaction between structures/fish and seabirds



Impact Steel Pile Installation

- Impact pile driving of steel piles can result in elevated sound pressure levels
- Sound pressure waves are impulse waves characterized by a rapid rise time and fluctuation between overpressure and underpressure
- Highly variable and unpredictable



Effects of Impact Pile Driving

- Direct mortality from elevated sound pressure levels
- Delayed mortality
- Behavioral changes



Effects of Impact Pile Driving (con't)



Impact Pile driving (con't)



Alternatives to Impact Installation (Avoid)

- Silent pile drivers
- Vibratory installation only where no load bearing required
- Rock anchors/micro piles
- Alternate materials (e.g., concrete, plastic)



Noise Attenuation (Mitigate)

- Bubble curtains (confined/unconfined)
- Isolate work area/
dewatering



Endangered Species Act of 1973

- What is it
 - Mainly concerned with section 7
 - 7(a)(2) states each federal agency shall insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species.
- How does it affect projects?
 - FHWA/Corps 401 permit
 - Legal responsibility to comply
 - Section 9 violations
- Process
 - Applicant-Consultant-Corps/FHWA-Services



What To Expect During Consultation

- Is this formal or informal
 - Informal-concurrence letter (30 days)
 - Formal-Biological Opinion with Terms and Conditions
 - 135 days once all information is received
- Harm vs. Harass thresholds
 - 180dB (re:1 μ pas)
 - 150 RMS (re:1 μ pas)
- Minimize the impact
 - Bubble curtains
 - Vibratory vs. impact hammer
 - Other noise attenuation devices



ESA Listed Salmonid Life Histories

- Chinook Salmon (King, Tyee)
 - Present in Nearshore as juveniles
 - Could be in PS year round
- Bull Trout (Dolly Varden, Arctic char)
 - 4 life histories. Pacific NW has the only anadromous form.
 - Found as adults and sub-adults, usually within nearshore







Marbled Murrelet Life History



Photo by Aaron Barna

- Robin-sized diving seabird
- Federally listed as Threatened
- Nests in mature forest
- Forages primarily on fish
- Forage in pairs, congregate in groups
- Flightless during molt
- Present year round
- Occurrence in marine environment unpredictable



Hood Canal Floating Bridge Example



Above-water Noise

- Noise shroud
- Timing

Below-water Noise

- Bubble curtain
- Murrelet hazing



Hood Canal Floating Bridge Example

Seabird Observation and Hazing

- Moved murrelets out of injury zone
- Documented seabird response
- Tracked incidental take
- 291 murrelets were hazed
- 85% were successfully moved
- No injured murrelets observed



Questions?



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